Soil and Ash Sampling Plan
TVA Kingston Plant
Kingston, TN

January 8, 2008

Soil and Ash Sampling Plan
TVA Kingston Plant
Kingston, TN

In response to the release of coal ash from the TVA Kingston Plant Ash Landfill, the TN Department of Environment and Conservation (TDEC) developed a plan to collect soil and ash samples. Ash was deposited across TVA property in a northerly direction, into the Emory River and its embayment and onto residential property across from the Ash Landfill. The goal of the soil and ash sampling is to determine the level of chemical constituents in the ash that was released. TVA has used coal to fuel its Kingston Fossil Plant since 1955. Coal ash generated from coal combustion has been placed into the Ash Settling Pond and Landfill since 1958. Literature suggests the types of heavy metals and other chemical constituents that are present coal ash. However, the types of heavy metals and other chemical constituents and their amount in coal ash vary depend upon the source of the coal. To make informed decisions about ash management and remediation options, TDEC determined that samples should be collected from three distinct locations; (1) coal ash from the Ash Landfill, (2) ash and native soil on residential properties and (3) samples of soil outside the impacted area.

After reviewing previous TVA analytical results from Kingston ash samples and literature discussing the chemical constituents found in coal ash, it was decided that all ash and soil samples would be analyzed for Total Metals, Toxicity Characteristic Leaching Procedure (TCLP) Metals, Polynuclear Aromatic Hydrocarbons and Gross Alpha and Beta (to check for radioactivity). Sample collection and analyses will be performed following Environmental Protection Agency and Nuclear Regulatory Commission protocols. The chemical constituents for each analysis are provided in Attachment 1. The results of the analyses will be compared with state and federal cleanup criteria to determine if the levels of constituents present require management of the ash as a hazardous substance.

Two composite samples from the Ash Landfill, soil and composite ash samples from fifteen impacted residential properties and two soil samples shall be collected. The location of each sample will be identified by both street address and geographic coordinates taken using Global Positioning equipment. Samples will be labeled and identified by location, sample media, type, analysis required, sample collector, weather conditions, date & time, etc. Samples will be stored during collection and transport as required in the sample collection protocol. Sample collection, transport and delivery shall follow standard chain-of-custody protocols. Samples shall be taken from the sampling site to the TN Department of Health (TDH) Laboratory in Knoxville, TN. TDH will ship samples from its Knoxville Laboratory to its Nashville Laboratory using overnight delivery.

TDEC has requested that the TDH Environmental Laboratory expedite analysis of these samples. It is anticipated that Total Metals, Polynuclear Aromatic Hydrocarbon and Gross Alpha & Beta analyses shall be completed within 24 to 48 hours of receipt. TCLP metal analyses are expected to require more time due to the soil extraction process required before analysis can begin. The TDH Nashville Laboratory shall report results to TDEC as soon as available.

Final Site Evaluation Quality Assurance Project Plan
U.S. Environmental Protection Agency

Science and Ecosystem Support Division
980 College Station Road
Athens, GA 30605

SESD Project ID #
SESD Category 2 QAPP

SECTION A: Project Planning Elements		
A1. Title (*Project Name*):	Kingston Steam Plant Fly Ash Pond	
Project Location:	Swan Pond Circle, Kingston, Tennessee	
Originating Organizations:	Tennessee Department of Environment and Conservation (TDEC) Division Solid Waste Management and Division of Remediation Knoxville Field Office *Note: TDEC is the preparing organization and the organization responsible for conducting the project.	
Project Manager's Name, Position, and Organization:	Paula Plont, Environmental Protection Specialist Division of Solid Waste Management Knoxville Field Office	
Project Manager's Signature:	Paula Plont	Date: 01-06-09
EPA Project Manager's Name and Position:	N/A TDOR Project	
EPA Project Manager's Sig	N/A	Date:
A2. Table of Contents	SECTION A: PROJECT PLANNING ELEMENTS SECTION B: DATA GENERATION AND ACQUISITION 	

A3. Distribution List	Andy Binford, Acting Diriector, DOR Mike Apple, Director, DSWM Chuck Head, Commisioner's Office Dan Hawkins, DOR/KFO Phil Chambers, Manager, KFO Larry Cook, DSWM, KFO Paula Plont, DSWM, KFO

A4. Project Personnel	**Organization**	**Responsibilities**
Paula Plont, Environmental Protection Specialist	TDEC-DSWM-KFO	Project Manager Sampling Team Member
Chris Andel , Environmental Specialist	TDEC-DOR-KFO	Site Safety Officer Sampling Team Member
Lee Barron, Geologist	TDEC-DOR-KFO	Registered Professional Geologist Sampling Team Member
Brad Parman, Environmental Specialist	TDEC-DOR-KFO	Sampling Team Member
Dan Hawkins, DOR Field Office Manager	TDEC-DOR-KFO	Sampling Team Member Quality Assurance Manager
Erin Sutton, Geologist	TDEC-DOR-KFO	Maps, GIS, Sampling Team Member
Burl Maupin, Enviromental	TDEC-DOR-KFO	Sampling Team Member

Protection Specialist		
Comments: Due to staff constraints, some members of the sampling team will be functioning in dual roles. Sampling is expected to be accomplished in 1-2 days. The number of samples to be collected and limited media types will allow dual roles without compromising data quality or efficiency.		
Organization Chart: See Addendum A.		
A5. Background:	The Kingston Steam Plant Fly Ash Pond was part of the waste control system of the Tennessee Valley Authority's (TVA) Kingston Steam Plant in Roane County, Tennessee. The function of the facility is to generate electricity through the burning of coal to generate steam to turn turbines which provide electricity to the Tennessee Valley area. The plant has been in full operation since 1955. The generation of fly ash and bottom ash at the Kingston Steam Plant has been managed by the use of a series of impoundments on plant property. Both fly ash and bottom ash pumped to ash ponds on the property to facilitate settling of the ash. The ash is then pumped to dredge cells and the water is channeled into a settling pond. The dredge cells are surrounded by dykes utilizing compacted ash and a system of drains and runoff control measures. In the early morning hours on December 22, 2008, a catastrophic failure of a dredge cell occurred at the Kingston Steam Plant. It is estimated that the height of the ash in the dredge cell storage area was in excess of 50 feet prior to failure. The failure resulted in approximately 5.4 million cubic yards of fly ash being released over an area of more than 300 acres with impacts to the Clinch and Emory Rivers. In addition, the ash flow inundated roads, railroad tracks and private residential property. The chemical characteristics of the fly ash are wells documented. Constituents can include silica, heavy metals, radio-nuclides and Poly-nuclear Aromatic Hydrocarbons. Numerous activities are on-going to assess and mitigate the impacts of the incident. This sampling effort will assess native soil on impacted properties, background soil, and fly ash deposits on impacted properties.	
A6. Project Description:		

This sampling effort involves the collection of soil and ash samples to determine constituents present in the vicinity of the ash spill. This information may be used to determine further actions by TDEC and/or others regarding the affected properties.

There are approximately 15 impacted properties that will be sampled along with samples obtained from the ash cell itself.

- Two samples from each yard will be collected. One sample shall be the native soil and that sample shall be obtained at the surface to 2 inches in depth.
- The ash sample shall also be obtained at the surface to 2 inches in depth and be a composite sample from 5 aliquots. The sample shall include any physical variations the ash may exhibit (color, texture, etc.). Also note that each aliquot shall be the same volume and homogenized prior to putting it into the sample bottle.
- The soil sample shall be a grab sample.
- The ash and soil shall be analyzed for (1) Total Metal, (2) TCLP Metals, (3) PAH, and (4) radioactivity; alpha and beta.
- All sample points will be located using GPS and described in the field notebook.
- All pertinent information shall be recorded in a field book.
- Sampling, decontamination, sample preservation, and chain-of-custody procedures shall conform to standard EPA sampling procedures.
- It's expected that each sampling team will consist of three persons.

In addition background samples will be collected from an area of similar geology as follows:

Two (2) background surface soil samples will be collected in the Roane County Park located at the intersection of Caney Creek Road and US-70. Sample locations are approximately 5.7 miles southwest of the Kingston Steam Plant but still within similar surface and subsurface

	geologic conditions. The first sample (BG-73-501-001) will be collected from the surface soil developed on the alluvial material overlying the Lower Conasauga Group (Ccl) shale, siltstone, and limestone. The second sample (BG-73-501-002) will be collected from the residual soils from the Rome Formation (Cr) interbedded shale and sandstone.
Decision(s) to be made based on data:	This study is meant to provide initial information about the native soil conditions in the vicinity of the site and the constituents of the ash on residential properties. The data will help regulators determine the level of the threat on the residential properties and form a baseline for possible further studies and/or actions on the affected properties.

Applicable regulatory information, actions levels, etc.	To Be Determined
Field Study Date:	January 6-8, 2009
Projected Lab Completion Date:	Projected to be January 15, 2009
Final Report Completion Date:	January 20, 2009

A7. Quality Objectives and Criteria

DQOs are as follows:

•Review and evaluate all pertinent information regarding previous site history and site assessments of the Kinston Steam Plant site, in order to propose a scope of work that would collect sufficient data to determine whether this site poses a potential threat to human health and the environment.

•Using EPA guidance documents, collect enough information to adequately conduct a study which will provide initial information to assess current conditions on residential properties to aid in the decision making process.

•Analytical data collected during this investigation will be used to further assess if the release has resulted in a significant health impact to individuals living on the affected properties Analytical data will be compared to established background analytical data that will be collected as part of this investigation.

•Site-specific background screening concentrations will be established for all media types being investigated. The procedure specifies that if the background concentration of an analyte is greater or equal to its detection limit, the minimum requirement for an observed release for a particular contaminant is for the concentration of that contaminant to be at least three times greater than the background concentration or exceedance of other guidance documents, such as Region IX PRGs. If a specific analytes background concentration is below the detection limit, the minimum requirement for an observed release is that the concentration exceeds the sample quantitation limit of the background sample.

•Compare sample results to EPA Superfund and State Waste Cleanup criteria to determine if further actions are warranted by the EPA and/or TDEC. Sample concentrations will be compared to EPA Region IX PRGs and/or U.S.E.PA. Primary and Secondary Drinking Water Standards as specified in Chapter 62-550 FAC.

A8. Special Training/Certifications No special training needs have been identified for the project. Lee Barron will act as Certified Professional Geologist for the project. This is the only certification that is required under Tennessee Law. Due to the simplicity of the sampling effort, no special training in sampling is anticipated. All samplers have completed numerous courses taught by EPA and others. Training records are housed at the TDEC Knoxville Field Office. Should new training requirements be identified, written communication will be forwarded from the Project Manager (Paula Plont) to the DSWM Director (Mike Apple) for action.

All samplers will be trained in the importance of QA and the specific elements which are critical to this project. This training will be conducted by Dan Hawkins, QA Manager for the project.

A9. Documents and Records

Records and documents for this project include field notes, computer data files of raw data (GPS readings, analytical data, chain of custody, trip reports, and data validation reports/data quality assessments reports. The final document will be a Data Summary Report for The Kingston Steam Plant

Fly Ash Release. All documents and computer files will be stored at the TDEC-DOR Knoxville Field Office. DOR records are maintained in perpetuity in the Knoxville Field Office. All records pertinent to a site are maintained in paper format until all site activities have ceased and a final disposition has been achieved for the site. Site files are then scanned electronically and are stored and available for review on computer.

All field observations, measurements and sampling activities supporting the field investigation will be recorded and documented according to the SESD *Operating Procedure for Logbooks*, SESDPROC-010-R3.

Expected turnaround is aproximatley 1 week Analysis will be performed by the Department of Health State Laboratory.

SECTION B: Data Generation and Acquisition

B1. Sampling Design

An authoritative sampling design was chosen based on the data quality objectives of the study. Suggested references to include are the specific SESD SOPs applicable to your study.

Sample Number	Sample Media	Analyses	Rationale
Sample numbers will be delineated in the field based on specific address and GPS readings Ex. 73501-0000-SPC-FA	All Solid Matrix (Ash and Soil)	Metals, TCLP, PAHs, Radioactivity	Sampling is to document current conditions in the area of the Kingston Steam Plant Fly Ash release. Two samples will be collected from remnants of failed dredge cell. A field duplicate sample will be collected for ash and soil. An MS/MSD sample will be collected.. For information regarding the chemical parameters of interest including detection limits , regulatory standards/criteria, QA/QC criteria, analytical method number, sample preservation requirements, sample volume requirements and holding time criteria, please see Addendum B.

Volume, Holding Time, and Preservation Requirements.
All sampling, preservation, packaging and bottle use will be consistent with the following references:

SESD Operating Procedure for Packaging, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209, Most Recent version

U.S. EPA. Analytical Support Branch Laboratory Operations And Quality Assurance Manual. Region 4 SESD, Athens, GA, Most Recent Version

Sample types and sizes are included in Addendum C. Sample Collection Requirements for CLP and SESD references listed above.

Please see Addendum B and C.

Maps or Diagrams with sample locations: See Addendum D.

B2. Sampling Methods, General Procedures

Sampling efforts will be concentrated in the area affected by the ash release. Two background samples will be collected in areas thought to be unaffected by the ash release. In addition two samples of ash will be collected from the remnants of the dredge cell. Methods to be used will be decided in the field, but may include , hand trowel or serving spoon, depending on site specific conditions and access. All sampling will be in accordance with *SESDDPROC-302-R1 Waste Sampling* and *SESDPROC-300-R1 Soil Sampling.* Sampling equipment for this project includes:

10 Thirty Gallon Hefty Trash Bags
Approx. 2 Cu. Ft. of Ice (TDEC Ice Machine)
50 Hefty One Zip Freezer Bags
6 Sellstrom 690 Sell-Gard Hard Hats
2 Rubber Maid 10 Gallon Ice Chests
2 Rolls Handi-foil Aluminum Foil (S/N 51805)
6 Rolls of EPA Samples Seals
12 Stainless Steel Bowls
8 Pairs of Tyvek Coveralls
8 Pairs of Latex Rubber Booties
1 Nikon Camera CoolPix S50C (S/N 30006230)
6 Stainless Steel Trowels (Aris Mgr. Co. No. 3)
6 Stainless Steel Tamping Spoons (No S/N)
1 Rubbermaid 2 Gallon Bucket
6 Stainless Steel Auger Buckets (Bits)
2 Stainless Steel Shovels
2 Boxes Fisherbrand powder free Nitrile Gloves
1 Garmin GPSMAP 76C
5 Rolls Paper Towels

Sampling for this project is expected to be completed in two work days. Access to sampling locations is by land. No on-site support exists and none is necessary for this project. Route to hospital is contained in the Health and Safety Plan. Restaurants and restrooms are available nearby.

The key study personnel for this project are Paula Plont (Project Manager), Chris Andel (Site Safety Officer) Lee Barron (Registered Professional Geologist) and Dan Hawkins (QA Coordinator).

Minor decontamination is planned. Due to the small number of samples, dedicated equipment will be used when possible. In the event that decontamination is necessary, all activities will be in compliance with *SESD Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205, Most Recent Version.*

Please see Addendum B. for sample container requirements, preparation requirements, preservation requirements and holding time criteria.

B3. Sampling Handling and Custody

All samples will be handled and custody maintained in accordance with the SESD *Operating Procedure for Sample Evidence Management*, SESDPROC-005-R1.

B4. Analytical Methods SESD and CLP references are provided below. The Tennessee Department of Public Health Laboratory will be used for all analyses for this project. The actual methods are DOPH Laboratory Standard Operating Procedures.

SESD:	Suggested references are found at http://epa.gov/region4/sesd/asbsop/asb-loqam.pdf
CLP:	Suggested references are found at www.epa.gov/superfund/programs/clp.
Other:	No other analyses are anticipated.

B5. Quality Control

Field:	Two duplicate samples (fly ash and soil) , one MS/MSD and two background samples are proposed for this effort. The rationale for the limited number of QA/QC samples is based on the limited scope of the sampling (soil and ash only).
Laboratory:	The State of Tennessee Department of Public Health Laboratory will be be used. Data quality objectives include obtaining acceptable detection limits for decision making and scoring, avoidance of cross-contamination, and to produce data of known and acceptable quality. Applicable references in SOM01.1, CBC01.0. These references can found at: http://www.epa.gov/superfund/programs/clp/download/som/som11-factsheet.pdf http://www.epa.gov/superfund/programs/clp/download/cbc/cbc1fs.pdf Actual laboratory data quality objectives are defined by the DOPH Laboratory Standard Operating Procedures..

B6. Instrument/Equipment Testing, Inspection and Maintenance

Due to the simplicity of the sampling effort, little instrumentation will be required. The only instrument which will be used is a hand held Garmin GPSMAP 76C unit. The unit requires no calibration.

B7. Instrument/Equipment Calibration and Frequency

See B6 and Addendum E.

B8. Inspection/Acceptance for Supplies and Consumables

All critical supplies and consumables for this field investigation will be inspected prior to field activities commencing. Due to the simple nature of the sampling, minor field decontamination of field equipment is anticipated. Dedicated trowels will be used only once if possible. If decontamination is required all operations will be conducted consistent with *SESD Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205, Most Recent Version.*

The individuals responsible for ensuring that these requirements are met are:
Lee Barron, RPG, Paula Plont, Project Manager and Dan Hawkins, QA Manager.

B9. Non-direct Measurements:

None anticipated.

B10. Data Management

The project manager will be responsible for ensuring that all requirements for data management are met. All data generated for this field investigation, whether hand-recorded or obtained using an electronic data logger will be recorded, stored and managed according to the following procedures:

SESD Operating Procedure for Control of Records, SESDPROC-002-R3.
SESD Operating Procedures for Logbooks, SESDPROC-010-R3.

SECTION C: Assessment/Oversight

C1. Assessments and Response Actions

Assessments will be conducted during the field investigation according to the *SESD Operating Procedure for Project Planning*; SESDPROC-016-R1 to ensure the QAPP is being implemented as approved. The Project Manager is responsible for all corrective actions while in the field.

C2. Reports to Management

The Project Manager will be responsible for notifying the Division of Solid Waste Director if any circumstances arise during the field investigation that may adversely impact the quality of the data collected. Due to the anticipated short duration of the sampling event (one or two days), written progress reports are not anticipated to be necessary. Any problems that arise will be documented in the field log. The impact of these problems will be discussed with DSWM Management. Results of these discussions will be summarized in the final report.

The Data Summary Report shall include:

Site History/project background,

Description of Field Sampling Design,

Description of all fieldwork,

All investigative findings,

Summary of QA/QC and any impacts to the project.

.

The Project QA Officer shall prepare the QA/QC summary section of the report and provide this section to the Project Manager as soon as data validation is complete. This will be done before the bulk of the final report is completed. It shall be the responsibility of the QA Officer to review the assessment report to ensure the data is being interpreted properly before it is released for general review.

The Project Manager will be responsible for notifying DSWM Management if any circumstances arise during the field investigation that may adversely impact the quality of the data collected.

SECTION D: Data Validation and Usability

D1. Data Review, Verification, and Validation

Raw data and QA/QC data will be reviewed upon receipt of results from the Department of Public Health Laboratory. Every attempt will be made to verify and validate the data upon receipt. An inspection of MS/MSD and duplicate samples will be conducted and compared with DQO objectives and procedures

contained in US EPA Guidance (see below). Much of the data validation process for analytical data is defined in the contractual arrangement between EPA and the CLP Contract Laboratory.

All data review, verification and validation will be in accordance with *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. Region 4 Science and Ecosystem Support Division (SESD, Athens, GA. U.S.E.P.A. 2001.*

Flagged data will be evaluated to the suitability of inclusion in the data set. Flagged data will not be used unilaterally to make site decisions. Evaluation of flagged data will be conducted in compliance with EPA SOPs, including Analytical Support Branch Laboratory Operations and Quality Assurance Manual. Region 4 SESD, Athens, GA, Most recent version.

D2. Verification and Validation Methods

The Project Manager, Paula Plont will be responsible for validating the data. Ms. Plont is an Environmental Protection Specialist for DSWM in the Knoxville Field Office. She is unaffiliated with the DOPH Laboratory..

An extensive examination of the laboratory quality assurance documentation and the sample results will be conducted to verify that data accurately reflects site conditions. Please see above discussion for methods and references to be used.

D3. Reconciliation with User Requirements

Field blanks will not be taken in this study, due to the media specific nature (soil and ash). All sample results including data anomalies, MS/MSDs, field duplicates and background samples will be evaluated by the project manager and the QA manager to assure data quality. Should problems arise, The Division of Solid Waste Director, (Mike Apple) will be notified and appropriate measures will be taken to assure questionable data is not used in the decision making process. All reconciliation will be conducted in accordance with the EPA guidance specified in D1. above.

****Footnotes**: This Quality Assurance Project Plan (QAPP) has been prepared and approved according to the EPA *Requirements for Quality Assurance Project Plans (EPA QA/R5 EPA/240/B-01/003)*, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, March 2001(USEPA, 2001). This document will be used to ensure that the environmental data collected for this project are of the type and quality for the intended purposes.

KINGSTON STEAM PLANT FLY ASH
FIELD HEALTH AND SAFETY PLAN

1 Purpose

The purpose of this Health and Safety Plan is to assign responsibilities, establish personnel protection standards, establish mandatory safety operating procedures, and provide for contingencies that may arise while conducting this Site Investigation. All aspects of the field operations must comply with the U.S. EPA "Standard Operating Safety Guides" section of Personnel Protection and Safety course manual and Occupational Safety and Health Administration regulations (29 CFR 1910.120).

2 Site Safety Officer

The Site Safety Officer (SSO) for this investigation is:

Chris A. Andel, TDEC-DoR/KFO

The Site Safety Officer will assure that appropriate personnel protection equipment is available and properly utilized by all members of the field investigation team. He will also assure that proper emergency first aid equipment is available (eye wash station, first aid kit, etc.). The SSO's responsibilities will include oversight of work practices that will insure personnel safety, and correction of work practices or conditions that are or may appear to be hazardous. The SSO will have ultimate authority on all safety decisions and can suspend investigation operations if required safety procedures are not followed or if conditions become too hazardous for the level of protection provided.

3 Protective Clothing

Modified level D personal protective equipment will be worn by on-site personnel during sampling activities. Modified level D consists of normal work clothes worn beneath tyvek coveralls and disposable nitrile gloves, and includes safety glasses and steel-toed boots. Variations to this planned level of protection will be made by the site safety officer if site conditions warrant up-grading to a higher level.

Level C protection will include the addition of air purifying respirators equipped with OV/HEPA cartridges. Level C is not anticipated for the project, due to the current air monitoring and the saturation of the waste.

Additional protective equipment including disposable outer boots, hearing protection, and hard hats will be utilized if site conditions warrant.

4 Safety Equipment

Prior to and during sampling activities the work environment will be monitored to evaluate the associated risks. If conditions more hazardous than those presently anticipated are encountered, project operations shall cease until additional protection can be acquired or conditions return to a less hazardous state.

5 Site Specific Safety Instructions

Prior to the start of project operations, the site safety officer will discuss health and safety concerns with project personnel. This will include such physical hazards as the safe operation of soil sampling equipment; the risk of slips, trips and falls; and hypothermia associated with outdoor activities during the winter season. The chemical hazards associated with sampling soil and waste contaminated by fly ash and metals will also be covered.

Engulfment is a possible hazard for this project. Large quantities of waste fly ash have a consistency similar to quick-sand. Personnel sampling waste shall not step onto the waste and use methods which allow collection from the bank. Safety ropes will be available in case of a fall into the edge of the waste.

A review of air monitoring results and site conditions make it unlikely that respiratory protection will be required for ash samplers. In the event conditions change (i.e. TVA monitoring results increase, material dries out, etc.) a dust mask will be utilized.

The health and safety briefing will outline the procedures to be followed during an emergency situation, and the route to the nearest hospital. The nearest hospital is the Methodist Medical Center of Oak Ridge, 990 Oak Ridge Turnpike, Oak Ridge, Tennessee.

TABLE 4

EMERGENCY PHONE NUMBERS

Emergency Phone Number **911**

Ambulance Service 865-457-2520

Methodist Medical Center of Oak Ridge 865-481-1190

Kingston Fire Department 865-354-8045

Roane County Emergency Response 865-376-2331

Roane County Sheriff Department 865-376-5581

Parkwest Medical Center (Emergency) 865-373-1280

National Response Center 800-424-8802

National Poison Control Center 800-942-5969

Travel south on Swan Pond Circle/Swan Pond Road to US-70 W.

Turn Right on J LON FOUST HWY(US-70 W) - go 0.5 mi

Turn Right on PINE RIDGE RD - go 0.1 mi

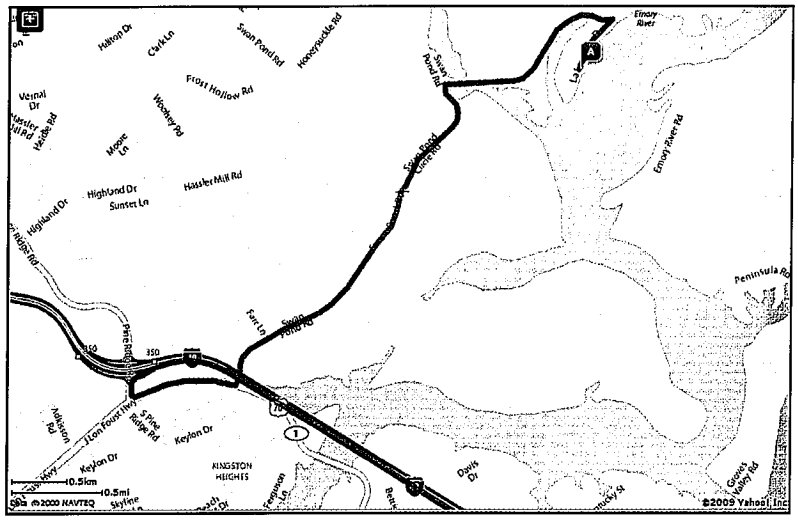
Turn Right to take ramp onto I-40 E toward KNOXVILLE - go 6.0 mi

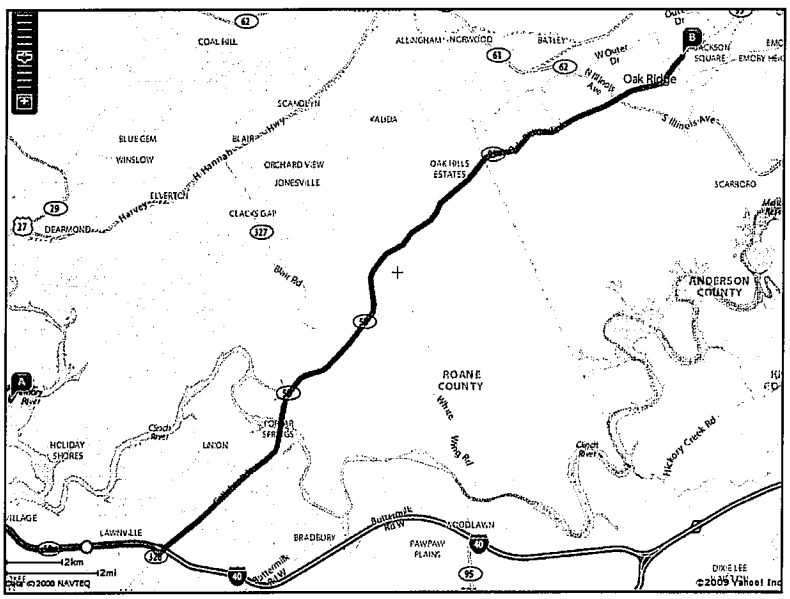
Take exit #356/OAK RIDGE (TN-58 N)/GALLAHER RD toward OAK RIDGE/TN-58 N - go 0.2 mi

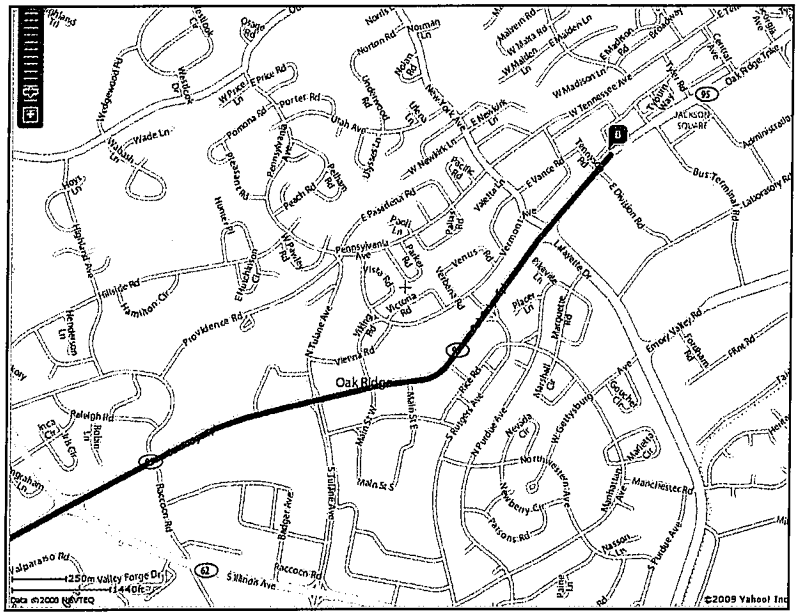
Turn Left on GALLAHER RD - go 4.3 mi

Continue on OAK RIDGE TPKE - go 12.2 mi

Arrive at 990 OAK RIDGE TPKE, OAK RIDGE, on the Left






Oak Ridge
Wedgewood Rd
Wade Ln
Providence Rd
Raleigh Rd
Raccoon Rd
Badger Ave
S Tulane Ave
N Tulane Ave
Main St W
Main St E
Main St S
Vienna Rd
Victoria Rd
Pennsylvania Ave
E Pasadena Rd
W Newkirk Ln
E Vance Rd
Vermont Ave
W Tennessee Ave
Lafayette Dr
Emory Valley Rd
Bus Terminal Rd
Laboratory Rd
Oak Ridge Tnpk
Jackson Square
N Purdue Ave
S Purdue Ave
S Rutgers Ave
W Gettysburg Ave
Northwestern Ave
Newberry Cir
Parsons Rd
Manchester Rd
Manhattan Ave
Nasson Ln
Valparaiso Rd
Valley Forge Dr
S Illinois Ave
Hillside Rd
Hamilton Cir
Highland Ave
Utah Ave
Porter Rd
250m
1440ft
Data ©2009 NAVTEQ
©2009 Yahoo! Inc

Attachment 1 – Chemical Constituents for Each Analytical Method

1. Toxicity Characteristic Leaching Procedure Metals

Arsenic (As)
Barium (Ba)
Cadmium (Cd)
Chromium (Cr)
Lead (Pb)
Mercury (Hg)
Selenium (Se)
Silver (Ag)

2. Total Metals

Aluminum (Al)
Antimony (Sb)
Arsenic (As)
Barium Ba)
Berylium (Be)
Cadmium (Cd)
Calcium (Ca)
Chromium (Cr)
Cobalt (Co)
Copper (Cu)
Iron (Fe)
Lead (Pb)
Lithium (Li)
Magnesium (Mg)
Manganese (Mn)
Mercury (Hg)
Molybdenum (Mo)
Nickel (Ni)
Selenium (Se)
Silver (Ag)
Strontium (Sr)
Tin (Sn)
Thallium (Th)
Titanium (Ti)
Vanadium (V)
Zinc (Zn)

3. Radioactivity

Gross Alpha
Gross Beta

4. **Polynuclear Aromatic Hydrocarbons**

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

Proposed Sampling Locations

N

PREPARED BY:
TENNESSEE DEPARTMENT OF ENVIRONMENT & CONSERVATION
DIVISION OF REMEDIATION-KNOXVILLE FIELD OFFICE
3711 MIDDLEBROOK PIKE
865-594-6035

1 inch = 300 feet

0 125 250 500 750 1,000 Feet

Berkshire Lane

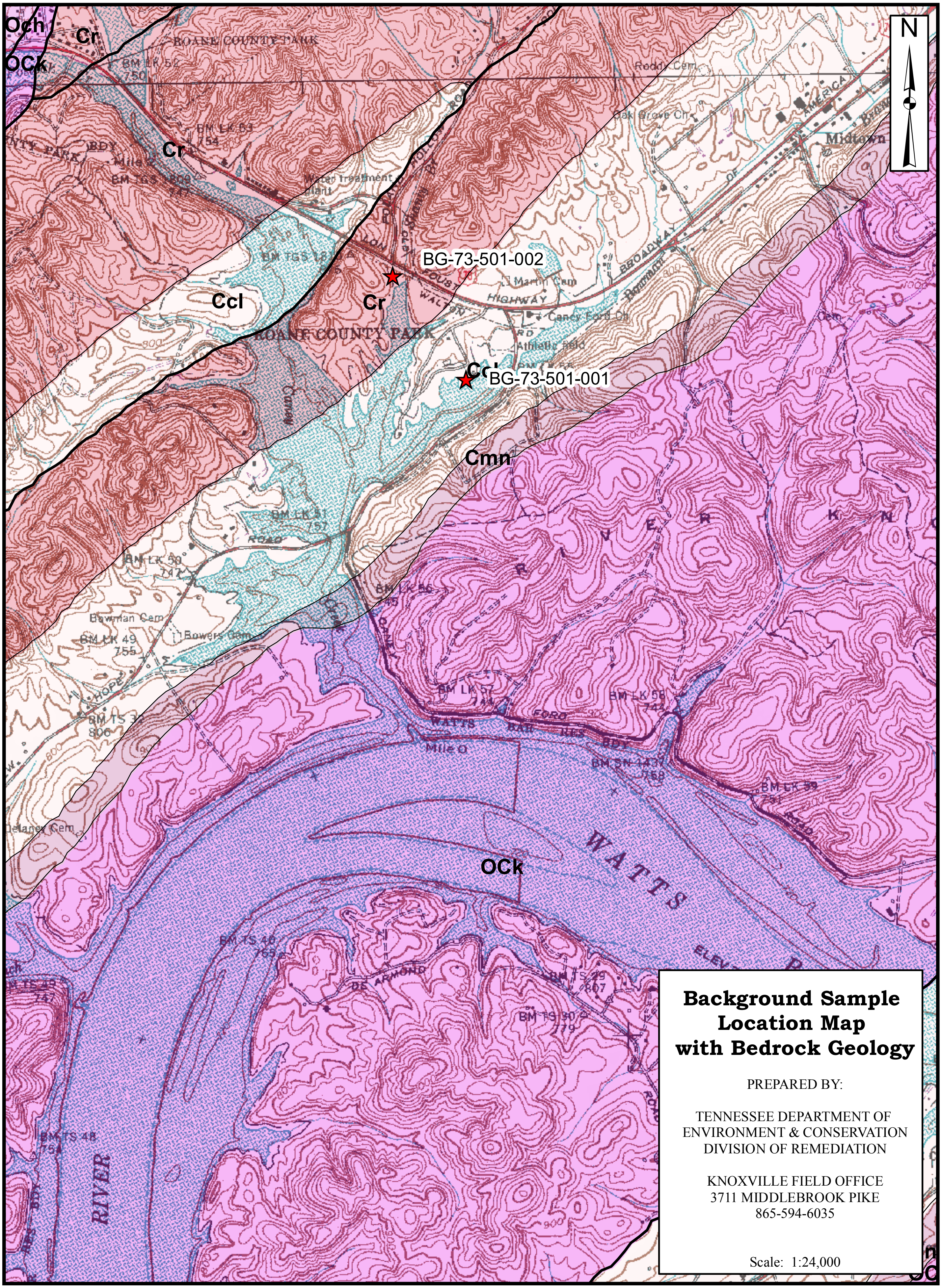
Swan Pond Circle

Lakeshore Drive

Text

Sample Designations

1	SS-73-501-199LSD-01	16	FA-73-501-208SPC-01
2	FA-73-501-199LSD-01	17	SS-73-501-206SPC-01
3	SS-73-501-190LSD-01	18	FA-73-501-206SPC-01
4	FA-73-501-190LSD-01	19	SS-73-501-194SPC-01
5	SS-73-501-178LSD-01	20	FA-73-501-194SPC-01
6	FA-73-501-178LSD-01	21	SS-73-501-188SPC-01
7	SS-73-501-172LSD-01	22	FA-73-501-188SPC-01
8	FA-73-501-172LSD-01	23	FA-73-501-148SPC-01
9	SS-73-501-170LSD-01	24	SS-73-501-129SPC-01
10	FA-73-501-170LSD-01	25	FA-73-501-129SPC-01
11	SS-73-501-166LSD-01	26	SS-73-501-134BL-01
12	FA-73-501-166LSD-01	27	FA-73-501-134BL-01
13	SS-73-501-162LSD-01	28	SS-73-501-137BL-01
14	FA-73-501-162LSD-01	29	FA-73-501-137BL-01
15	SS-73-501-208SPC-01		



Background Sample Location Map with Bedrock Geology

PREPARED BY:

TENNESSEE DEPARTMENT OF ENVIRONMENT & CONSERVATION
DIVISION OF REMEDIATION

KNOXVILLE FIELD OFFICE
3711 MIDDLEBROOK PIKE
865-594-6035

Scale: 1:24,000